**Algebra 2: Practice Final Exam Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Provide a definition of the word *function* as it is used in Algebra. Then, give a real life example, explain how it is a function, and describe the domain and range of your function.

Definition: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Real-life example and explanation:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Linear, exponential, and quadratic functions have very different shapes when graphed. Describe the shape of each function **and** explain what causes each function to have that shape.

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**Directions for questions 3 – 6:** Determine whether the relationships depicted are linear or exponential. Write the equation that models each relationship, and define your variables where indicated.

1. A baby has just started talking. She knows ten words, but the number of words in her vocabulary is doubling every month.

**Type of function: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Variables:** \_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Aaron is given $200 as a graduation gift. He spends an average of $35 per week.

**Type of function: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Variables:** \_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| --- | --- |
|  |  |
| **11** | **20** |
| **12** | **23** |
| **13** | **26** |
| **14** | **29** |
| **15** | **32** |

**Type of function: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

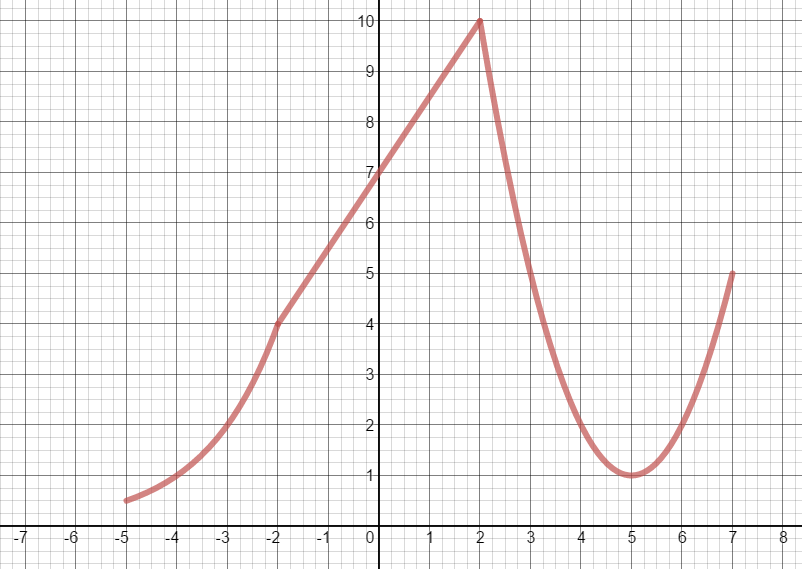
**Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |
| --- | --- |
|  |  |
| **-1** | **1** |
| **0** | **2** |
| **1** | **3** |
| **2** | **4.5** |
| **3** | **10.125** |

**Type of function: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Directions for questions 7 – 13:** Below is the graph of . Use the graph to answer the questions that follow.



1. Is the graph a function? Explain how you know.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. On what intervals is increasing? Use inequality or interval notation.
2. On what intervals is decreasing? Use inequality or interval notation.
3. What is the domain of ? Use inequality or interval notation.
4. What is the range of ? Use inequality or interval notation.
5. Evaluate: = \_\_\_\_\_\_\_\_\_.
6. Evaluate: = 5 when *x*  = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. True or false? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Bonus:** Write the equation of the graph as a piecewise function.

1. Draw a line on the coordinate plane below and write its equation in the space provided.



Write the equation of your line:

**Equation:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. On the same coordinate plane, draw a line that is parallel to your line and passes through the point (2, 3).

Write the equation of the second line. **Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Explain how you know that the two lines are parallel.

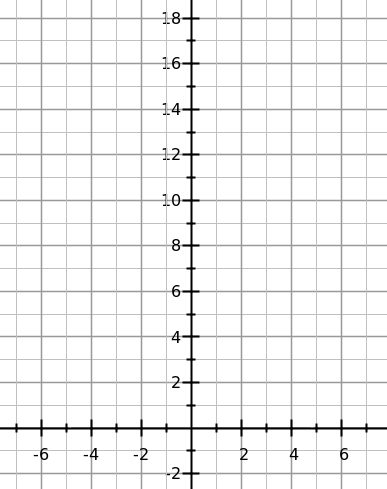
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1. Write the equation of the line that passes through the points (1, 5) and (4, -1).

**Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**



1. Complete the input-output table and graph:

|  |  |
| --- | --- |
|  |  |
| **-3** |  |
| **-2** |  |
| **-1** |  |
| **0** |  |
| **1** |  |
| **2** |  |
| **3** |  |

1. Graph:



1. Graph:



1. Graph:

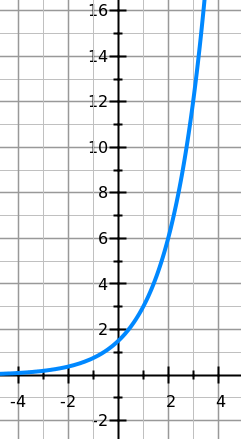


1. Draw the graph and write the equation of a parabola that opens up, is skinnier than the parent quadratic function, and has no *x*-intercepts.



**Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Write the function equation shown by the following graph:



**Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**



A.

B.

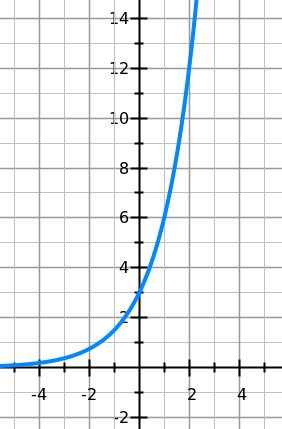
C.

D.

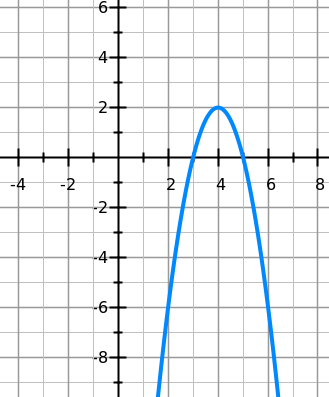
E.

F.

1. Which of the following is a solution to the system of equations
   1. Both a and d
   2. Both b and c
2. The graph of *f(x)* is shown. Which of the following is a point on *f(x)*?



1. Write the vertex form, factored form, and standard form equation for the following graph:



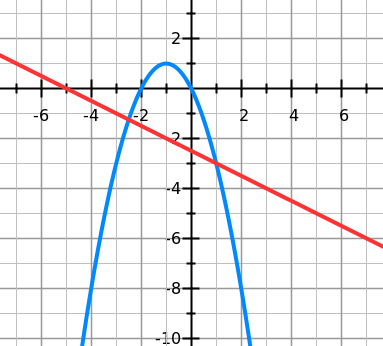
**Vertex Form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Factored Form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Standard Form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Write the equation for a parabola with a vertex at (1, 4) and its right arm passes through the point (5, 2).
2. Write the equation for the parent parabola shifted to the right by two units and down by six units.
3. What is the value of *g* in the equation
4. Which of the following quadratic equations has **one solution**?

**Directions for questions 33-35:** Use the graphs of *f(x)* and *g(x)* below to answer the following three questions.



1. \_\_\_\_\_\_\_
2. True or False?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Bonus: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. Solve the following system by graphing:

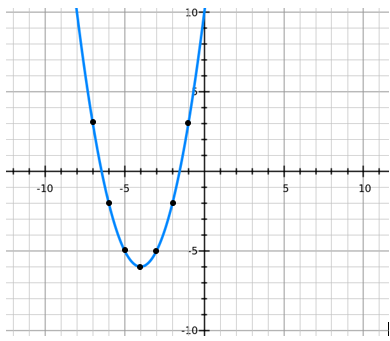


1. Simplify:
2. Simplify:
3. Simplify:
4. Simplify:
5. Simplify:
6. Solve:
7. Distribute and write in standard form:
8. Distribute and write in standard form:
9. Factor completely:
10. Factor completely:
11. Factor completely:
12. Solve:
13. Solve:
14. Solve:
15. You bought your first home for $225,000 and its value has grown by 1.2% each month since then. How much will your home be worth in 4 years?
16. You hire a taxi that charges a flat pick-up fee and a rate per mile. After the first three-mile stretch, you owe $6.95. After the full journey of eleven miles, you owe a total of $12.15

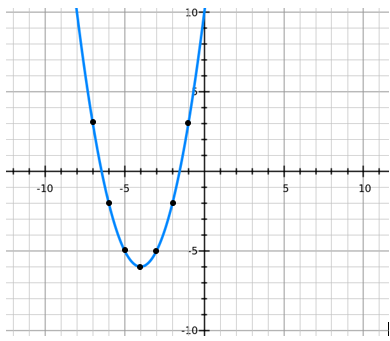
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1. Write an equation that shows the total cost of your trip as a function of the number of miles you ride.
2. At this rate, how much would it cost to take a 15 mile trip?
3. A scientist is testing a new medicine on two bacteria populations. Population A started with 1,000 bacteria cells but the medicine is causing the number of cells to decrease by 3.1% every day. Population B started with 4,000 bacteria cells but the medicine is causing the number of cells to decrease by 275 each day.
4. Write an equation for the number of bacteria cells in Population A after *x* days.
5. Write an equation for the number of bacteria cells in Population B after *x* days.
6. If the test is ten days long, which bacteria population will have more cells remaining at the end of the test?
7. A soccer ball is kicked straight up with a starting upward velocity of 64 ft/s from a starting height of 2 ft.
8. After how many seconds will the ball reach its maximum height?
9. What will its maximum height be?
10. After how many seconds will the ball hit the ground?
11. Each of the following shows the graph of . Graph the transformations shown.

Transformation:



Transformation:



1. Sketch the graph of on the coordinate plane below. Then sketch and label the following transformations.

